

## **REMARKS**

This communication is in response to the Non-Final Office Action dated July 1, 2010. Claims 3, 4, 13-24 and 26 have been withdrawn from consideration. Claims 5-9 were previously canceled, without prejudice. Claims 1 and 10 have been amended. No new matter has been added. Claims 1-4 and 10-26 remain pending in this application with claims 1, 10 and 16 being the only independent claims. Reconsideration is respectfully requested in view of the amendments to the claims and arguments presented below.

### **Election/Restriction**

Claims 3, 4, 13-24 and 26 have presently been withdrawn from consideration. If the arguments presented herein traversing the prior art rejections with respect to independent claims 1 and 10 are deemed persuasive and the claims are allowed, Applicant request rejoinder of the following withdrawn claims: (i) claims 3, 4 and 26 which depend from independent claim 1; and (ii) claims 13-15 which depend from independent claim 10.

### **Claim rejections under 35 USC § 112**

The Examiner rejected claims 1, 2, 10-12, and 25, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner asserts the limitation “low active surface energy” recited in independent claims 1 and 10 is a relative term which renders the claims indefinite.

Applicant maintains that the term “low surface energy” is a well recognized term of art. This is well established by 4920 hits when conducting a search of issued US Patents on Public PAIR for the term “low surface energy.” Moreover, the conventional definition of the term is the tendency of a surface to repel, rather than attract, another material. Low surface energy prevents an adhesive from sufficiently wetting a surface.

Withdrawal of the rejection under 35 U.S.C. §112, second paragraph, in view of the arguments presented in the preceding paragraph is requested.

### **Claim rejections under 35 USC § 102**

Claims 1, 2, 10 and 11 are rejected under 35 U.S.C. §102(b) as anticipated by Liepins (US 4,390,567).

Claims 1, 2, 10-12 and 25 are rejected under 35 U.S.C. §102(b) as anticipated by the publication by Chang et al. (Appl. Phys. Lett. 51(2), 13 July 1987).

Applicant respectfully traverses the outstanding prior art rejections for at least the reasons discussed in detail below.

### **I. Prior Art Anticipatory Rejection by Liepins**

#### **Independent Claims 1 & 10**

Claim 1, as amended, calls for “a second material deposited particle-by-particle on the surface of the substrate material while the surface of the substrate material is in an energetically excited state.” (emphasis added)

Support for the amendment to claim 1 is found in paragraph [0017] of the specification, as originally filed. No new matter has been added.

Liepins discloses a fluid containing a metal or mixture of metals which is sobbed or diffused into a polymeric coating on a substrate (Col. 2, l. 66 through Col. 3, l. 8). Accordingly, Liepins fails to disclose or suggest depositing the metal “particle-by-particle” or that such depositing occurs while the substrate material is in an energetically excited state.

Claim 1 is further distinguishable in that it calls for “a nano-structured transition region comprising nano-composites is formed between the substrate material and the second material in such a way that the transition region has a layer thickness between 20 nm and 20 μm and is predominantly formed of nano-composites.” (emphasis added) Sorption or diffusion processes as disclosed in Liepins do not occur in an energy range sufficient to allow for the formation of

nano-composite particles or nano-composite structures.

Yet a still further distinguishing claimed limitation over Liepins is the nano-indented surface and nano-indented solid region of the substrate material in amended claim 1, which the prior art reference neither discloses nor suggests.

Independent claim 10 contains limitation similar to those discussed above with respect to claim 1 and thus is patentable over the prior art for at least the same reasons.

## **II. Prior Art Anticipatory Rejection by Chang et al.**

### **Independent Claims 1 and 10**

Claim 1 calls for “a substrate material having a nano-indented surface and a nano-indented solid region proximate to the surface comprised of polymer compounds with a low active surface energy, and

a second material deposited particle-by-particle on the nano-indented surface of the substrate material while the nano-indented surface of the substrate material is in an energetically excited state.” Thus, the substrate material has a nano-indented surface and solid region prior to the deposition of the second material while in an energetically excited state. However, Chang et al. does not call for this preliminary step of nano-indentation of the surface and solid region of the substrate prior to deposition of a second material while in an energetically excited state. Instead, the morphology of the surface of the substrate is only disclosed during sputtering (e.g., the energetic excitation of the substrate), not prior to sputtering.

Furthermore, claim 1 specifies “a nano-structured transition region comprising nano-composites is formed between the substrate material and the second material in such a way that the transition region has a layer thickness between 20 nm and 20  $\mu$ m and is predominantly formed of nano-composites, and wherein a ratio of substrate material to the second material in a direction transverse to the transition region changes from predominantly substrate material in an immediate vicinity of the substrate material to predominantly the second material in an immediate vicinity of the second material, with the substrate material transitioning into the second material with a nano-structure.” (emphasis added) Thus, the nano-composites formed in

the transition region are “nano-structured.” Such term is expressly defined in paragraph [0013] of the specification as “a structure in the nanometer range, i.e., the existence of structural elements having dimensions, such a length, width, height, diameter, in the nanometer range, whereby the number of atoms and/or molecules forming a structural element are smaller than in micostructures.” (emphasis added) The sputtering process taught by Chang et al. alters the surface morphology by forming filaments whose heights increase with sputtering time, reaching several  $\mu\text{m}$  at longer sputtering times. {Chang et al. publication: p. 104, left hand side, first paragraph}(emphasis added) Thus, in contrast to the claimed invention which expressly calls for nano-structure (smaller than microstructure), the filaments formed during sputtering in Chang et al. only produce microstructure.

Independent claim 10 contains limitation similar to those discussed above with respect to claim 1 and thus is patentable over the prior art for at least the same reasons.

**CONDITIONAL PETITION FOR EXTENSION OF TIME**

If entry and consideration of the amendments above requires any further extension of time, Applicants respectfully requests that this be considered a petition therefore. The Commissioner is authorized to charge any fee(s) due in this connection to Deposit Account No. 14-1263.

**ADDITIONAL FEE**

Please charge any insufficiency of fees, or credit any excess, to Deposit Account No. 14-1263.

Respectfully submitted,

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